CHAPTER 6

PROJECTING PARTIAL RETIREMENT EARNINGS

I. OVERVIEW

This chapter focuses on projecting the work behavior and earnings of 62 and 67 year old Social Security beneficiaries. The projections are carried out on a sample of persons born between 1931 and 1960 who were Social Security beneficiaries at age 62 and/or age 67. For this sample of individuals, partial retirement earnings at age 62 are projected to the year 2022 and partial retirement earnings at age 67 are projected to the year 2027.

The projections, which take account of scheduled increases in the Social Security exempt amount between 1996 and 2002, are carried out in two steps. The first step involves estimating a statistical model which captures beneficiaries' decisions about whether to work and their level of earnings. This model is estimated with data from the 1984 and 1990-92 panels of the Survey of Income and Program Participation (SIPP). The second step uses the estimated coefficients from the statistical model as a means of projecting partial retirement earnings of 62 and 67 year olds to the year 2027.

This chapter first considers the estimation phase, and includes a discussion of the data set and sample, the statistical model, and the estimated coefficients. This is followed by a discussion of the projection methodology and results.

II. ESTIMATING PARTIAL RETIREMENT EARNINGS

1. Data Set and Sample

The estimation of partial retirement earnings is carried out using the 1984 and 1990-92 panels of the SIPP. Earnings data from the Social Security Summary Earnings Records (SER) were merged with the SIPP data for all four panels, providing information on covered earnings from 1951 through 1996. Additionally, information about (1) the year an individual first received Social Security benefits and (2) whether the individual received disability benefits is obtained from the Master Beneficiary Record (MBR) for panels 1984 and 1990-91. The MBR for the 1992 SIPP panel was not available at the time the estimation was carried out, so this information was obtained from self reports as recorded in the 1992 SIPP. The 1984, 1990 and 1991 SIPP panels provide two full calendar years of information (1984-85, 1990-91, and 1991-92, respectively), while the 1992 SIPP panel provides three full calendar years of information (1992-94).

Rather than estimating the statistical models with only 62 and 67 year olds, we expand the age criteria as a way of increasing the sample size. For the younger group, we include both 62 and 63 year olds in the analysis, and for the older group, we include persons ages 65 through 68. A slight data "mismatch" arises regarding individuals' ages because an individual's age is spread across two calendar years (except for persons born on January 1), while the Social Security rules regarding benefit receipt and SER reported earnings are based on a calendar year. In this analysis, we follow people over a calendar year rather than a birth year.

To capture the work behavior of Social Security beneficiaries accurately, we restrict the sample to individuals who are beneficiaries over the entire calendar year. This restriction places an additional constraint on the calendar year in which we can examine the work behavior of 62 year old beneficiaries. Because the majority of individuals are first eligible for benefits at age 62, we analyze the work behavior of 62 year old beneficiaries in the calendar year *after* their 62nd birthday. In other words, an individual's age in a particular calendar year is defined as his/her age on January 1 of that year. For consistency across the sample, the ages of all individuals in the sample are defined similarly.

The discussion of the data below separately considers 62-63 year old beneficiaries and 65-68 year old beneficiaries because the statistical models are estimated separately for these two groups. One reason for estimating the models separately is that the two populations may behave differently, as 62-63 year olds are in the early stages of retirement relative to 65-68 year olds. A second reason is that the available data allow us to observe exogenous changes in the exempt amount (relative to the average wage) for persons age 65 through 68, but not for persons age 62 through 63. Between 1977 and 1982 there were exogenous increases in the exempt amount for persons age 65-68. This program difference translates into differences in data availability and specification of the estimating model. For projection purposes, this information is of particular interest for 67 year old beneficiaries because the Social Security exempt amount is scheduled to increase from $14,500 in 1998 to $30,000 in the year 2002 for persons at or above the normal retirement age, but is not scheduled to increase (relative to the average wage) for persons under the normal retirement age.[1]

Estimating the partial retirement earnings of 62 and 63 year olds is carried out using the 1990-92 panels of the SIPP. Only the most recent 1990-92 data are used for this younger group of retirees because nothing is gained, in terms of observing ad hoc adjustments to the exempt amount, by using the earlier 1984 data. Focusing on 62-63 year old beneficiaries gives a sample of persons who were born between 1926 and 1931.[2] If an individual meets this age criterion in two different calendar years, then that individual is included in the sample twice.[3] Allowing persons to enter the sample more than once was done in order to increase the sample size.[4]

Combining the 1990 through 1992 panels of the SIPP in this manner provides a sample of 1,533 62 and 63 year olds who are receiving Social Security benefits, of whom 439 (28.6 percent) are working.[5]

For persons age 65 through 68 we use the 1990-92 SIPP panels, as well as the 1984 SIPP panel. The design of the data set from the 1990-92 panels is similar to that described above, where individuals are included in the data set multiple times if they meet the inclusion criteria.[6] For the 1990-92 SIPP panels, the sample consists of persons who were born between 1921 and 1928.[7] The final sample includes 6,138 persons age 65-68 receiving Social Security, of whom 1,226 (25.0 percent) are working.

The 1984 SIPP panel is also used for 65-68 year old beneficiaries because it allows us to observe a time period during which the Social Security exempt amount (relative to the national average wage) changed for persons in this age group. Between 1977 and 1983 the exempt amount for 65-68 year olds more than doubled, increasing from $3,000 in 1977 to $6,600 in 1983.[8] While the 1984 SIPP primarily has individuals' information beginning in 1984, the SER data allow us to observe individuals' earnings during this 1977-83 time period. Thus, we use the 1984 SIPP (along with the SER and MBR) to examine Social Security recipients' work behavior and earnings from 1976 through 1983. The primary difference between the data sets created from the 1984 and 1990-92 SIPP panels is that the data set created from the 1984 SIPP does not contain information on individuals' non-labor income in the same year that earnings are observed (i.e., the information is not coterminous).[9] The final sample of persons from the 1984 SIPP were born between 1907 and 1917; that is, persons who were age 68-68 in 1976-83. In this case, the sample size was expanded by allowing individuals to be included multiple times. The resulting sample from the 1984 SIPP includes 5,942 Social Security recipients, of whom 1,389 (23.4 percent) are working.

Prior research has shown that a large portion of Social Security beneficiaries locate near or at the exempt amount, and that a relatively small proportion have earnings well above the exempt amount.[10] Figures 6-1 through 6-3 present the ratio of earnings to the exempt amount and their relative frequencies for the three samples described above.[11]

Figure 6-1, which displays information for 65-68 year old beneficiaries from the 1984 SIPP, shows that beneficiaries (1) cluster around the point where earnings equals the exempt amount (i.e., the ratio of earnings to the exempt amount equals one) and (2) seldom have earnings well above the exempt amount. Figures 6-2 and 6-3 show a somewhat similar pattern for beneficiaries in 1990-92, but the clustering around the point where earnings equals the exempt amount is less pronounced. The primary similarity between the three figures is that there are a relatively small number of people with earnings well above the exempt amount.

Figure 6-1
Ratio of Earnings to Exempt Amount
Persons Age 65 to 68, SIPP 1984

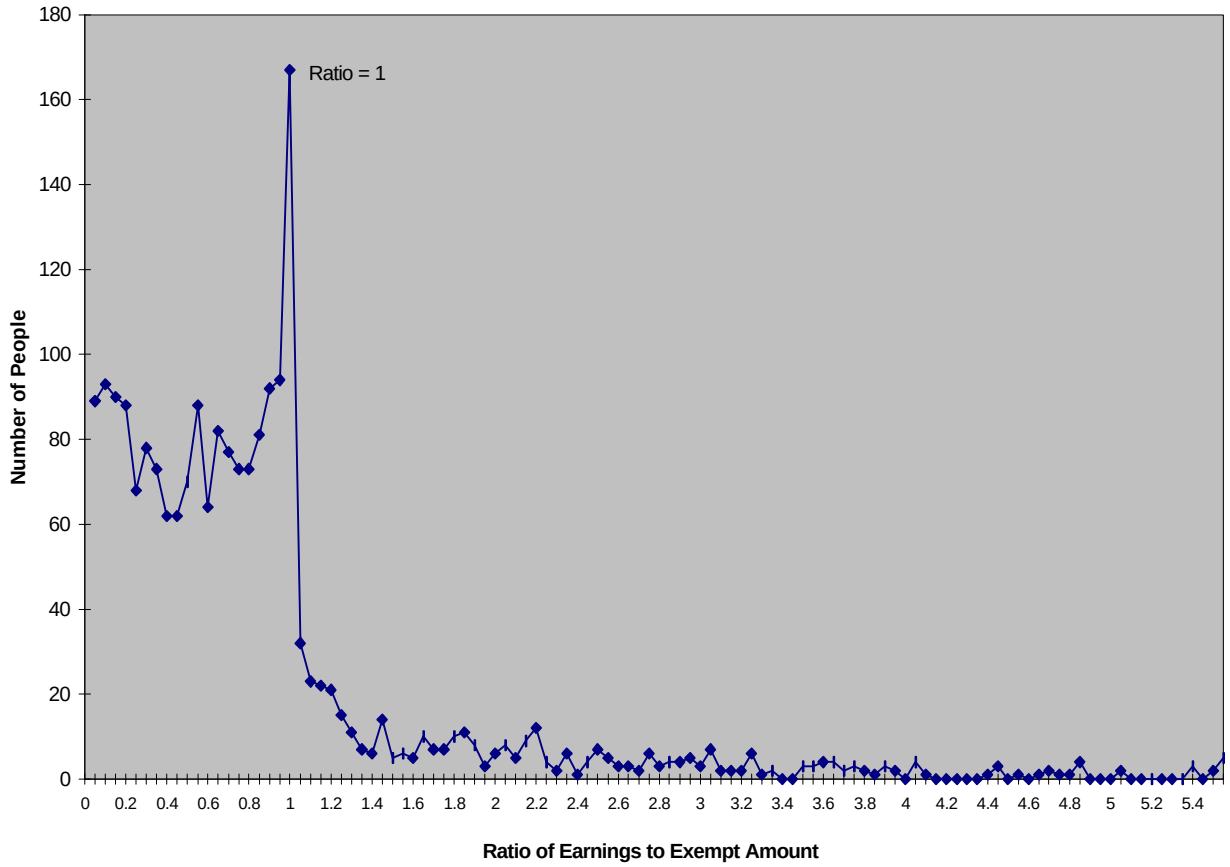


Figure 6-2
Ratio of Earnings to Exempt Amount
Persons Age 65 to 68, SIPP 1990-92

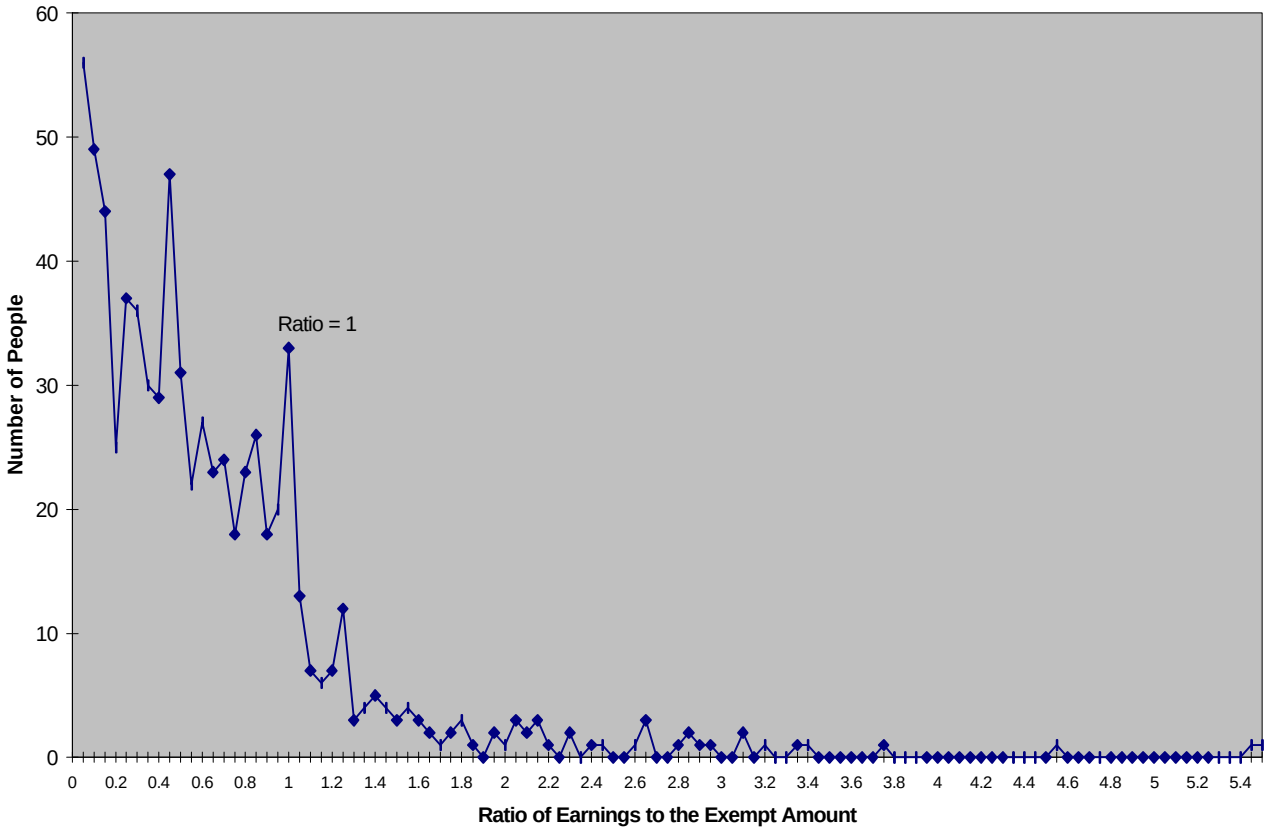
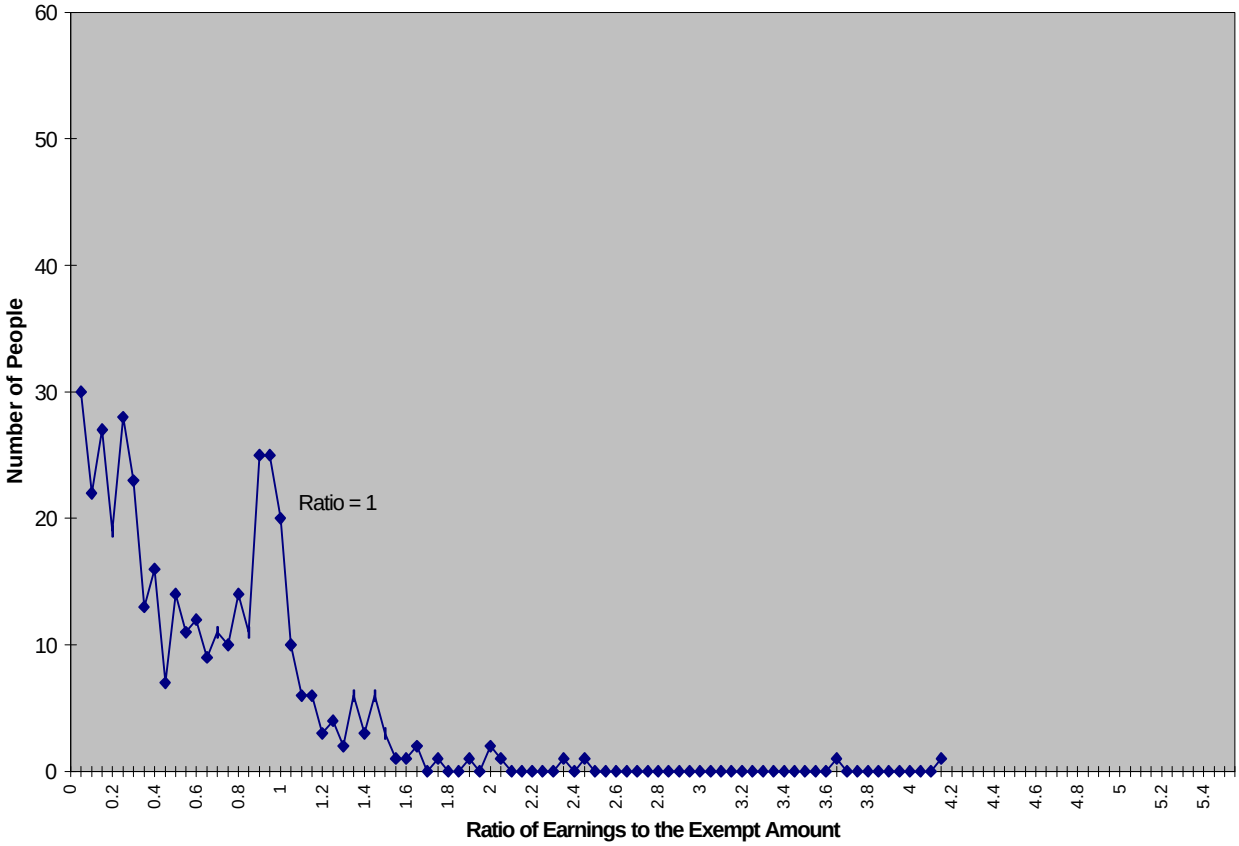


Figure 6-3
Ratio of Earnings to Exempt Amount
Persons Age 62 to 63, SIPP 1990-92



2. Estimating Model

In this statistical analysis, we estimate two models. We began with a two-equation model, where the first equation incorporates the decision to work or not work, and the second equation estimates the level of earnings for those individuals who work. This first model is referred to as the *probit/earnings model*.[12] In preliminary analyses, we found that the second stage earnings equation had very limited explanatory power. In other words, the observable characteristics of *working* beneficiaries provide little information about their earnings *levels*.

In the earnings equations for both young (62-63) and old (65-68) working beneficiaries, none of the coefficients for demographic variables (such as age, marital status, educational attainment) were statistically significant at the 10 percent level of significance. For the older beneficiaries, a few of the economic variables had statistically significant effects, but none of these variables had statistically significant effects for the younger beneficiaries.[13] The limited explanatory power of the earnings equations, particularly for younger beneficiaries, makes it difficult to obtain reliable earnings projections.

The limited ability of the probit/earnings model to explain working beneficiaries *level* of earnings led us consider an alternate modeling approach. Rather than predicting individuals' *level* of earnings, we predict "roughly" where on the earnings distribution an individual will fall. To do this we use an ordered probit model.[14] To estimate this model, the earnings distribution is divided into four segments, where the break points are based on the information provided in Figures 6-1 through 6-3. These segments are: (1) no earnings, (2) earnings greater than 0 but less than 85 percent of the exempt amount ($0 <$ ratio of earnings to the exempt amount < 0.85), (3) earnings between 85 percent and 115 percent of the exempt amount ($0.85 \leq$ ratio of earnings to the exempt amount ≤ 1.15), and (4) earnings greater than 115 percent of the exempt amount (ratio of earnings to the exempt amount > 1.15). The estimated coefficients from the ordered probit model allow us to project where on the earnings distribution future beneficiaries will fall. This approach, however, does not have a second stage earnings equation, so in the projection phase earnings are assigned randomly.[15]

For 62-63 year old beneficiaries, the probit/earnings and ordered probit models were estimated using the 1990-92 SIPP data. For 65-68 year olds there are multiple options because two data sets were created -- one with the 1984 SIPP and one with the 1990-92 SIPP. The 1984 SIPP is of significant value because it can be used to exploit the exogenous increases in the Social Security exempt amount that occurred between 1977 and 1983. That is, we can estimate the effect of an increase in the exempt amount on the earnings of beneficiaries aged 65-68 using the 1984 SIPP data. One option is to use only the 1984 SIPP to estimate the earnings of 65-68 year old beneficiaries. However, as described previously, using the 1984 SIPP data in this way has a drawback. Detailed coterminous data on several key explanatory variables are not available (these variables include IRA, 401k, and Keogh account balances, pension income, and wealth).

We address this issue by estimating the models for 65-68 year olds separately on the 1984 SIPP and the 1990-92 SIPP data sets, and then using the information from both analyses in the projection. Combining information from models estimated with the 1984 SIPP data and the 1990-92 SIPP data may provide the most complete set of information for projection purposes. In this case, we do the following: (1) estimate the model using the 1984 SIPP, where the exempt amount is one of the explanatory variables and (2) estimate the model using the 1990-92 SIPP data, where the coterminous variables are among the explanatory variables. With this approach, the projection is carried out using the estimated coefficient on the exempt amount obtained from the analysis using the 1984 SIPP, and all other estimated coefficients come from the models estimated with the 1990-92 SIPP data.[16]

For older beneficiaries, we estimate both the probit/earnings and ordered probit models with the 1984 and 1990-92 SIPP data sets. With the 1984 SIPP, we estimate an additional three earnings equations, where the ranges of earnings are defined by break points used in the ordered probit model.[17] We estimate these additional earnings equations to obtain additional information regarding how a $1 increase in the exempt amount affects beneficiaries' earnings.

Information obtained from estimating the probit/earnings models with the 1990-92 SIPP (for both older and younger beneficiaries) was not used in the projection phase, so these models are not discussed in detail. See Appendix 6-B for the results from these models. The focus of the discussion below is on the following models:

- 62-63 Year Old Beneficiaries, 1990-92 SIPP: Ordered probit model
- 65-68 Year Old Beneficiaries, 1990-92 SIPP: Ordered probit model
- 65-68 Year Old Beneficiaries, 1984 SIPP: Probit/earnings model, ordered probit model, plus other earnings equations.

The explanatory variables included in the models are listed below (interactions between some of these variables are also included in the models).[18]

In the ordered probit and probit models the explanatory variables are:

- Social Security exempt amount (1984 only)
- average earnings (*two* measures): age 35-55 and age 56-61 (1990-92, 62-63 year olds)/ age 35-59 and age 60-64 (1990-92, 65-68 year olds)/ age 45-59 and age 60-64 (1984)[19]
- family pension income (1990-92 only)
- family wealth (1990-92 only)
- family balance of IRA, 401k, and Keogh accounts (1990-92 only)
- indicators of age

- indicator of whether the individual is non-Hispanic white
- indicator of whether the individual has less than a high school education
- indicator of whether the individual has a high school education only
- indicator of the individuals' gender and marital status[20]
- spouse's age (where applicable)

and in the earnings equation estimated with the 1984 SIPP the explanatory variables are:

- Social Security exempt amount
- average earnings: age 60-64[21]
- indicators of age

The results of the models are presented in the following order: (1) 62-63 year old beneficiaries using the 1990-92 SIPP, (2) 65-68 year old beneficiaries using the 1990-92 SIPP, and (3) 65-68 year old beneficiaries using the 1984 SIPP. Recall that in the ordered probit, individuals are placed into four groups:

Group 0: No earnings.
Group 1: Earnings greater than 0 but less than 85 percent of the exempt amount.
Group 2: Earnings between 85 percent and 115 percent of the exempt amount.
Group 3: Earnings greater than 115 percent of the exempt amount.

Ordered Probit Model Results for 62-63 Year Old Beneficiaries, 1990-92 SIPP

The explanatory variables in the ordered probit model for 62 year old beneficiaries include those variables listed in the previous section. This model, however, distinguishes between married female beneficiaries and all other beneficiaries. Specification tests revealed that married females behave differently with regard to post-retirement employment and earnings, as compared to unmarried persons and married males. In addition to including a variable indicating whether an individual is a married female, married female status is interacted with several other explanatory variables.

The ordered probit model presented in Table 6-1 was estimated on a sample of 1,533 persons, where 1,094 persons are in earnings group 0, 300 are in earnings group 1, 94 are in earnings group 2, and 45 are in earnings group 3. The model includes 13 explanatory variables, of which eight have effects statistically different from zero at the 5 percent level (P-values less than 0.05), but the other five variables do not have statistically significant effects at even the 10

Table 6-1
Ordered Probit Model[a]
Social Security Beneficiaries Age 62 to 63, 1990-92 SIPP

Explanatory Variable	Ordered Probit (obs=1,533)	
Non-Hispanic White	0.1549	(0.1015)
Education Less than 12th Grade	-0.3413 **	(0.0955)
Education Equal to 12th Grade	-0.1011	(0.0843)
Age 63	-0.0657	(0.0682)
Married Female	-0.4693 **	(0.1183)
Married Female * Spouse Age	-0.0334 **	(0.0159)
Family Wealth[b]	-0.0023	(0.0053)
Family Pension Benefits	-0.7562 **	(0.1348)
Family Pension * Married Female	0.4393 **	(0.1904)
Family Retirement Balances (IRA, 401k, Keogh)	-0.0209	(0.0391)
Average Past Earnings (ages 35-55)	-0.1772 **	(0.0897)
Average Recent Earnings (ages 56-61)	0.4913 **	(0.0886)
Average Recent Earnings * Married Female	0.5721 **	(0.1898)
Pseudo R-square	0.0580	
Chi-squared	148.36 (df=13)	
Cutoff value 1	0.2870	(0.1346)
Cutoff value 2	1.1194	(0.1371)
Cutoff value 3	1.7111	(0.1450)

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.

b) Family wealth, family pension benefits, average past earnings, and average recent earnings are divided by national average earnings.

c) Standard errors in parentheses.

d) Significance at 5 percent is represented by "**".

percent level. Of these five coefficients, three have P-values ranging between 0.13 and 0.34, and two measures of a family's financial well-being -- family wealth and family retirement balances -- have significantly higher P-values of about 0.65. Coefficients for both of these financial well-being variables have the expected sign, so we have chosen to keep them in the model.

Coefficients from an ordered probit equation are somewhat difficult to interpret, but they do produce some important unambiguous results. One such result is that a positive coefficient indicates that an increase in the explanatory variable will cause the probability of working to rise and a negative coefficient indicates that an increase in the explanatory variable will cause the probability of working to decline.

Discussion of the results for the younger beneficiaries focuses first on the variables found to have statistically significant effects at the 5 percent level. Starting with the demographic variables, the model results suggest that persons with less than a high school education are *less* likely to work than persons with more than a high school education. We also find that married female beneficiaries are *less* likely to work than other beneficiaries. Married female status is interacted with the spouse's age and the estimated coefficient suggests that women who are married to older men are *less* likely to work than women who are married to younger men, all else being equal. The model does not include an interaction between spouse's age and married male status because spouse's age was not found to influence significantly the behavior of married men.

The model suggests that higher pension benefits *reduce* the probability of working. This reduction, however, is smaller for married females than for other beneficiaries. This smaller effect for married females is evident from the positive and statistically significant coefficient on the interaction term between pension benefit level and the indicator of married female status.

Table 6-1 also shows that while beneficiaries with higher average recent earnings (between ages 56 and 61) are more likely to work, the positive (and large) coefficient on the interaction term of recent earnings and married female status suggests that recent earnings play a larger role in the work decision of married female beneficiaries. Although higher average *recent* earnings (ages 56 to 61) is found to increase the probability of working, higher average *past* earnings (ages 35 to 55) is found to decrease the probability of working. A comparison of these two coefficients shows that the negative impact of past earnings is substantially smaller than the positive impact of more recent earnings.

For the five variables with effects that are not statistically different from zero, yet are included in the projection component, we find the following: (1) non-Hispanic white beneficiaries are *more* likely to work than minority beneficiaries, (2) beneficiaries with a high school degree (only) are *less* likely to work than beneficiaries with more than a high school degree, (3) 63 year old beneficiaries are *less* likely to work than 62 year old beneficiaries, (4)

higher wealth holdings *reduce* the probability of working, and finally, (5) higher retirement account balances (IRA, 401k, and Keogh) *reduce* the probability of working.

The relatively large number of explanatory variables with significant effects is reflected in the chi-squared statistic. The chi-squared statistic has a value of 148.36, and with 13 degrees of freedom it is well above the critical value of 22.36. Since this is not a linear model, we cannot compute an R-squared value. However, we have calculated a pseudo-R-squared statistic. This calculation is based on the log-likelihood value in the estimated model (the "restricted" model) and the log-likelihood value in a model with only a constant (the "unrestricted" model).[22] In this ordered probit model, the value of this pseudo-R-squared is 0.058.

Ordered Probit Model Results for 65-68 Year Old Beneficiaries, 1990-92 SIPP.

For the older beneficiaries (age 65-68), we have more flexibility because the sample size is substantially larger (6,138 versus 1,533).[23] The estimated coefficients from the preliminary ordered probit models suggest that married beneficiaries are less likely to work than unmarried beneficiaries, so we *split* the sample by marital status and estimated two separate equations. The estimation of identical model specifications for unmarried beneficiaries and married beneficiaries resulted in coefficient estimates that were quite different, providing evidence that splitting the sample is preferred. An indicator variable for gender was included in these two models, and the coefficient estimates suggest that *unmarried* males and females are similar, while *married* males and females differ. As a result, we further split the sample of married persons into married males and married females. The net result is that, for older beneficiaries, we estimate three separate ordered probit equations -- one for unmarried persons (n=1,831), a second for married males (n=2,121), and a third for married females (n=2,186).

The models estimated for older beneficiaries include explanatory variables that were taken from the set of variables included for younger beneficiaries. Variables with highly insignificant coefficients were omitted from the estimation equation because these coefficients have a high probability of being zero, and therefore, we do not want to include them in the projection phase. As a result, the estimation equations for the three groups do not have the same set of explanatory variables. The estimated coefficients are presented in Table 6-2. The results are presented first for unmarried persons, then for married males, and finally, for married females.

***Unmarried Beneficiaries*:** The model for unmarried beneficiaries includes nine explanatory variables, of which five have statistically significant effects at the five percent level and one has statistically significant effects at the 10 percent level. The statistically significant coefficients include those for an indicator of whether the individual has less than a high school education, three indicator variables for beneficiaries' ages, family pension benefits, and average

Table 6-2
Ordered Probit Model by Marital Status and Gender[a]
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Unmarried People (n=1,831)		Married Males (n=2,121)		Married Females (n=2,186)	
Education Less than 12th Grade	-0.3766 **	(0.0885)	-0.2947 **	(0.0661)		
Education Equal to 12th Grade	-0.1127	(0.0842)				
Spouse's Age			-0.0171 **	(0.0052)	-0.0126	(0.0081)
Age 66	-0.1770 *	(0.0955)				
Age 67	-0.2572 **	(0.0940)	-0.1800 **	(0.0717)	-0.1516 *	(0.0881)
Age 68	-0.3177 **	(0.0942)	-0.3171 **	(0.0729)	-0.2836 **	(0.0959)
Family Wealth [b]	-0.0002	(0.0094)	-0.0007	(0.0046)		
Family Pension Benefits	-1.2946 **	(0.1836)	-0.6591 **	(0.0807)	-0.3996 **	(0.0964)
Average Past Earnings (ages 35-59)	-0.1109	(0.0957)	-0.5460 **	(0.0769)		
Average Recent Earnings (ages 60-64)	1.0328 **	(0.0885)	0.7097 **	(0.0531)	1.4470 **	(0.0920)
Pseudo R-squared	0.0913		0.0845		0.1283	
Chi-squared	229.98 (df=9)		278.02 (df=8)		257.74 (df=5)	
Cutoff value 1	0.5757	(0.1042)	-1.0196	(0.3316)	0.3831	(0.5565)
Cutoff value 2	1.4070	(0.1104)	-0.0222	(0.3315)	1.3188	(0.5586)
Cutoff value 3	1.7707	(0.1180)	0.3688	(0.3326)	1.7084	(0.5616)

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Family wealth, family pension benefits, average past earnings, and average recent earnings are measured relative to national average earnings.
c) Standard errors in parenthesis.
d) Significance at 5 percent is represented by "**".
e) Significance at 10 percent is represented by "*".

recent earnings. The coefficients on these six variables indicate the following with respect to the work behavior of unmarried beneficiaries: (1) beneficiaries with less than a high school education are *less* likely to work than beneficiaries with more than a high school education, (2) beneficiaries between the ages of 66 and 68 are *less* likely to work than 65 year old beneficiaries, (3) beneficiaries with higher pension benefits are *less* likely to work, and (4) beneficiaries with higher average earnings between the ages of 60 and 64 are *more* likely to work.

The effect of the indicator variable for whether the beneficiary has a high school degree (only) is not statistically significant at conventional levels, but it remains in the model because the P-value is not particularly high (0.18) and the coefficient has the expected sign (negative). Also, the magnitude of the coefficient is reasonable in that it suggests that individuals with a high school degree (only) have (1) a *lower* probability of working as compared to beneficiaries with more than a high school degree, but (2) a *higher* probability of working as compared to individuals with less than a high school degree. The coefficient on average past earnings (age 35-59) has a somewhat higher P-value (0.25), but remains in the model. The negative sign on this coefficient is consistent with the findings for younger beneficiaries; while higher *recent* earnings *increase* the probability of working, higher *past* earnings *decrease* the probability of working.

The coefficient on family wealth is small (negative) and not statistically significant. Estimating the model with an alternative measure of wealth -- family income from assets -- produces a negative and statistically significant (at the 10 percent level) coefficient. The final model, however, does not include income from assets because this variable is measured differently in the SIPP data set than in the MINT projection data set. Because wealth, when measured in terms of income from assets, has statistically significant effects, we chose to keep the wealth variable in the model even if, as measured, its effects are highly insignificant. The negative coefficient on the wealth variable suggests that beneficiaries with a higher level of wealth are less likely to work.

In addition to this model for unmarried beneficiaries, we estimated another, similar model, with the addition of a variable capturing family retirement account balances (i.e., 401(k), IRA, and Keogh). The results of this model, presented in Appendix 6-D Table 6-D-1, suggest that persons with higher 401(k), IRA, and Keogh account balances are *more* likely to work (significant at the five percent level). While these retirement account balances were found to increase the probability of working, family wealth and pension benefit levels were found to have the opposite effect. One explanation for this apparently anomalous result is that persons with high account balances are likely to be self-employed, particularly because this measure includes Keogh accounts. The positive and significant coefficient may be therefore picking up a self-employment effect instead of an effect of higher retirement account balances. Because individual contributions to retirement accounts are increasing and a larger percentage of contributions in the future will be for employees (rather than the self-employed), this estimated positive relationship between account wealth and working is not likely to persist. Therefore, our final projections for older beneficiaries exclude the effect of these retirement accounts.[24]

For this model, the chi-squared statistic has a value of 229.98, which is well above the critical value of 16.92 (9 degrees of freedom). This is not a linear model, so we compute a pseudo-R-squared statistic rather than an R-squared value. In this model, the value of the pseudo-R-squared is 0.091.

***Married Male Beneficiaries*:** The estimated coefficients from the ordered probit model for married male beneficiaries are presented in column 2 of Table 6-2. Unlike the model for unmarried beneficiaries, this model excludes an indicator of educational attainment equal to high school and an indicator variable for age 66. These variables are excluded because their effects are highly insignificant.[25]

The results for married males are similar to those found for unmarried persons, although the former model includes an indicator of the spouse's age. The results suggest that the work decision of married male beneficiaries is influenced by the age of their wife. Men who are married to younger women are more likely to work in retirement, as compared to men who are married to older women. Recall that in the model for younger beneficiaries we found that married men's work decisions were not affected by their wives' age.

***Married Female Beneficiaries*:** The third model considers the work behavior of married female beneficiaries (see column 3 of Table 6-2). In this model we include only five explanatory variables -- indicator variables for age 67 and age 68, family pension benefits, average recent earnings, and age of the spouse. The results of this model, in terms of the signs of the coefficients, suggest that (1) beneficiaries are *less* likely to work as they get older, (2) higher pension benefits lead to a *lower* probability of working, (3) beneficiaries with higher recent earnings are *more* likely to work, and (4) female beneficiaries married to older men are *less* likely to work.

Average past earnings (age 35-59) and the indicators of educational attainment and age are not included in the list of explanatory variables because they have highly insignificant effects.[26] The family wealth variable is excluded from the model for two reasons. First, neither the coefficient on family income from assets nor family wealth is statistically different from zero. In addition, the coefficients on these two variables are of opposite signs, making the direction in which wealth affects the post-retirement work decision at age 67 ambiguous.

As was the case with the other models, the chi-squared statistic for these two models (married males and married female) is well above the critical value. The pseudo-R-squared is 0.085 for the married male model and 0.128 for the married female model.

Results for 65-68 Year Old Beneficiaries Using the 1984 SIPP.

Models estimated with the 1984 SIPP include the (1) probit/earnings model, (2) ordered probit model, and (3) three additional earnings equation. The additional earnings equations are

estimated as a means of obtaining more information about how a one dollar increase in the exempt amount affects beneficiaries earnings. These three models are discussed in turn below.

The two-equation probit/earnings model is presented in Table 6-3.[27] Recall that the first equation incorporates the decision to work or not work, and the second equation estimates the level of earnings for those individuals who work. In the work/no work equation, the coefficient on the Social Security exempt amount is negative, but the coefficient is not statistically different from zero. A negative coefficient on this variable would suggest that an increase in the exempt amount reduces the probability that an individual will work (not the expected sign). In the *earnings equation*, however, the coefficient on the exempt amount is positive and statistically different from zero at the one percent level of significance, suggesting that an increase in the exempt amount increases the earnings of *working* beneficiaries. The estimated coefficient of 0.466 suggests that a one dollar increase in the exempt amount will in turn increase the earnings of working beneficiaries by 46.6 cents. Overall, this model suggests that the Social Security exempt amount does not influence beneficiaries' decisions about whether to work, but does influence their decisions about how much to earn.

The next model that we consider is the ordered probit model, which is presented in Table 6-4. The estimated coefficient on the Social Security exempt amount from this ordered probit model is negative and is not statistically significant, as in the probit model.[28] If we look only at the ordered probit results, we would conclude that the Social Security exempt amount does not influence beneficiaries earnings behavior. The results of the probit/earnings model, however, suggest otherwise.

Because the probit/earnings model result indicating that an increase in the Social Security exempt amount increases the *earnings* of working beneficiaries is strong (i.e., the coefficient on the exempt amount in the earnings equation is significant at the one percent level), we choose to incorporate this information into the projection phase. That is, the projection phase will be such that the Social Security exempt amount does not influence beneficiaries' decisions about whether to work, but does influence their decisions about how much to earn.

The projections could be carried out using the estimated coefficient from the earnings equation which suggests that a one dollar increase in the exempt amount leads to a 46.6 cent increase in the earnings of working beneficiaries. One drawback of this approach is that *all* working beneficiaries' earnings are assumed to be identically affected by a given increase in the Social Security exempt amount. For example, if the exempt amount increases by 10 dollars, the earnings of all working beneficiaries will rise by $4.66, regardless of whether that beneficiary has earnings well below the exempt amount or at the exempt amount.

Table 6-3
Probit/Earnings Model
Persons Age 65 to 68, SIPP 1984

Explanatory Variable	Probit (obs=5942)		Earnings (obs=1389)	
Social Security Exempt Amount	-0.3929	(0.4243)	** 0.4663	(0.2005)
Non-Hispanic white	** -0.1429	(0.0570)		
Education less than 12th grade	**-0.1410	(0.0509)		
Education equal to 12th grade	0.0445	(0.0546)		
Male	** 0.2290	(0.0456)		
Age 66	** -0.1012	(0.0506)	-0.0207	(0.0228)
Age 67	** -0.1964	(0.0517)	-0.0209	(0.0243)
Age 68	** -0.2882	(0.0529)	-0.0203	(0.0261)
Average past earnings (ages 45-59)	** -0.1881	(0.0692)		
Average recent earnings (ages 60-64)	** 0.6527	(0.0593)	** 0.1971	(0.0264)
Constant	0.1216	(0.0941)	** -0.6199	(0.1782)
Inverse Mills Ratio[a]			-0.0917	(0.0809)
Pseudo R-squared/R-squared[b]	0.06130		0.1093	
Chi-squared / F-statistic[c]	395.92 (df = 10)		17.93 (df= 6, 1382)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

Table 6-4
Ordered Probit Model
Social Security Beneficiaries Age 65 to 68, 1984 SIPP

Explanatory Variable	Ordered Probit (obs=5,942)	
Social Security Exempt Amount	-0.5619	(0.4061)
Non-Hispanic white	** -0.1222	(0.0547)
Education less than 12th grade	** -0.1540	(0.0476)
Education equal to 12th grade	0.0066	(0.0511)
Male	** 0.2251	(0.0440)
Age 66	** -0.1107	(0.0482)
Age 67	** -0.1970	(0.0492)
Age 68	** -0.3030	(0.0507)
Average past earnings (ages 45-59)	** -0.2067	(0.0663)
Average recent earnings (ages 60-64)	** 0.7134	(0.0567)
Pseudo R-squared	0.0533	
Chi-squared	480.51 (df=10)	
Cutoff value 1	0.5710	(0.1705)
Cutoff value 2	1.2527	(0.1711)
Cutoff value 3	1.7028	(0.1722)

a) Standard errors in parenthesis.
b) Significance at 10 percent is represented by "*".
c) Significance at 5 percent is represented by "**".

It is unlikely that beneficiaries at different point of the earnings distribution are similarly affected by changes in the Social Security exempt amount, so we split the earnings distribution into three segments and estimate a separate earnings equation for each segment: the first earnings equation includes beneficiaries with earnings greater than 0 but less than 85 percent of the exempt amount, the second earnings equation includes beneficiaries with earnings between 85 percent and 115 percent of the exempt amount, and the third earnings equation includes beneficiaries with earnings greater than 115 percent of the exempt amount. The results of these three earnings equations are presented in Table 6-5.

In all three of the earnings equations, the coefficient on the exempt amount is positive, suggesting that an increase in the exempt amount increases the earnings of working beneficiaries. The estimated coefficients and standard errors from the earnings equations suggest that these coefficients are statistically different from zero. The coefficient estimates suggest that a $1 increase in the exempt amount will increase earnings by (1) $0.25 for beneficiaries with earnings well below the exempt amount (group 1), (2) $0.94 for beneficiaries with earnings in the near or at the exempt amount (group 2), and (3) $1.44 for beneficiaries with earnings over the exempt amount (group 3).[29] While we would not expect the value for this last group to be greater than $1, we cannot reject the null hypothesis that a $1 increase in the exempt amount increases the earnings by $1. This is because the standard error on the coefficient is relatively large -- the coefficient is 1.44 and the standard error is 0.50. These are estimates that are included in the projection phase.

III. PROJECTING PARTIAL RETIREMENT EARNINGS

1. Procedure Used to Project Partial Retirement Earnings

Partial retirement earnings are projected using a sample of individuals from the 1990-1993 SIPP panels who were born between 1931 and 1960. These projections are carried out using the subset of individuals who are Social Security beneficiaries (see Chapter 5). Other MINT projections used here include those for mortality, marital status, covered earnings, non-pension wealth, pension benefits, and IRA, 401(k) and Keogh account balances.

The projections are carried out in two steps. The first step is to determine into which of the four earnings groups individuals fall. This placement is based on the interaction between individual characteristics and the estimated coefficients from the ordered probit model. The second step is to assign working beneficiaries' a level of earnings. Because the earnings equations for working beneficiaries have little explanatory power, the earnings of working beneficiaries within these groups are assigned based only on a random number and a fixed distribution of earnings (from the 1990-1992 SIPP), not on individual characteristics.

Table 6-5
Earnings Equations for Working Beneficiaries, by Earnings Group
Social Security Beneficiaries Age 65 to 68, 1984 SIPP

Explanatory Variable	Earnings, Group 1 0< ratio < 0.85[a] (obs=871)		Earnings, Group 2 0.85<= ratio <=1.15[a] (obs=290)		Earnings, Group 3 ratio >1.15[a] (obs=228)	
Social Security Exempt Amount	** 0.2532	(0.0702)	** 0.9424	(0.0308)	** 1.4448	(0.4959)
Age 66	0.0139	(0.0095)	-0.0037	(0.0044)	-0.0517	(0.0609)
Age 67	0.0016	(0.0108)	0.0036	(0.0050)	0.0449	(0.0786)
Age 68	* 0.0232	(0.0129)	0.0011	(0.0061)	* 0.1764	(0.0910)
Average past earnings (ages 45-59) Average recent earnings (ages 60-64)	0.0139	(0.0212)	-0.0011	(0.0102)	0.2146	(0.1409)
Constant	0.0473	(0.0405)	0.0324	(0.0262)	-0.1648	(0.1956)
Inverse Mills Ratio[b]	-0.0097	(0.0292)	-0.0157	(0.0133)	** 2.2050	(0.9017)
R-squared	0.0288		0.7256		0.3152	
F-statistic	5.06 (df= 6, 864)		165.62 (df= 6, 283)		11.9 (df= 6, 221)	

a) Ratio is defined as earnings divided by the exempt amount.
b) This inverse mills ratio is "adjusted" to take account of the fact that individuals who enter each of the the earnings groups are a select group of individuals.
c) Standard errors in parenthesis.
d) Significance at 10 percent is represented by "*".
e) Significance at 5 percent is represented by "**".

Projecting Individuals' Earnings Group

These projections are based on the estimated coefficients from the ordered probit models. We multiply the individual characteristics of each beneficiary on the MINT file (X_i) by the estimated coefficients ($\hat{\beta}$). The resulting value ($X_i\hat{\beta}$) is used to calculate, for each individual, the predicted probability of falling into each of the four earnings groups. The predicted probabilities are based on the normal distribution and are defined as follows:

Probability Earnings Group 0: $\Phi(cutoff\ value\ 1 - X_i\hat{\beta})$
Probability Earnings Group 1: $\Phi(cutoff\ value\ 2 - X_i\hat{\beta}) - \Phi(cutoff\ value\ 1 - X_i\hat{\beta})$
Probability Earnings Group 2: $\Phi(cutoff\ value\ 3 - X_i\hat{\beta}) - \Phi(cutoff\ value\ 2 - X_i\hat{\beta})$
Probability Earnings Group 3: $1 - \Phi(cutoff\ value\ 3 - X_i\hat{\beta})$

The cutoff values 1-3 are presented, along with the estimated coefficients, in Tables 6-1 and 6-2.

To determine in which of the four earnings groups an individual will be placed, we compare the newly calculated predicted probabilities to a random draw probability from a uniform distribution (between 0 and 1). The following example helps highlight this process. Suppose that the calculated probabilities for an individual are as follows:

Predicted probability of group 0 is 0.532 (cumulative probability equals 0.532)
Predicted probability of group 1 is 0.251 (cumulative probability equals 0.783)
Predicted probability of group 2 is 0.148 (cumulative probability equals 0.931)
Predicted probability of group 3 is 0.069 (cumulative probability equals 1.000)

If the random draw is 0.456, then the individual is placed into group 0, because the random draw is lower than the predicted probability of being in group 0. However, if the random draw is 0.900 then the individual is placed into group 2, because the random draw falls above the group 1 cumulative probability but falls below the group 2 cumulative probability.

To impose consistency in individuals' earnings trajectories, we use the same random draw for both the age 62 and age 67 projections.

Projecting Individuals' Level of Earnings

As mentioned above, working beneficiaries' projected earnings are not based on individual characteristics, but are based on a (second) random draw and a fixed distribution of earnings. For the projections carried out here, the distribution of earnings is taken from the 1990-92 SIPP estimation data set.[30] Because individuals are placed into one of three earnings groups with non-zero earnings, the level of earnings from the SIPP data has been divided into three separate data sets. For example, individuals placed into earnings group 1 will be randomly assigned a level of earnings *from* the earnings of group 1 beneficiaries in the 1990-92 SIPP estimation data set.

In assigning working beneficiaries a level of earnings, the first step is to look at the individuals' assigned earnings group. Based on this assigned earnings group, the (SAS) program points to the appropriate earnings data set and based on a (second) random draw from a uniform distribution, the individual is assigned a level of earnings based on that draw. The level of earnings in these three separate SAS data sets are sorted from low to high, so a person with a low random draw will be assigned low earnings (relative to that group) and a person with a higher random draw will be assigned high earnings (relative to that group).[31]

2. Projections for 62 Year Old Beneficiaries

Projected Earnings Group

Overall, the results of our projections suggest that a higher fraction of 62 year old beneficiaries will be employed over the next two decades than the fraction of beneficiaries currently employed, as calculated from the 1990-92 SIPP. Table 6-6 presents a comparison of calculations from the 1990-92 SIPP (the "current" data) and MINT projection file (the "projected" data) by earnings group and marital status/gender. Calculations from the current data show that 70.4 percent of beneficiaries are not employed (i.e., in earnings group 0), whereas the projections based on the MINT file indicate that only 60.7 percent of beneficiaries will not work over the next few decades -- a difference of 10 percentage points.[32]

A comparison of these percentages by marital status and gender shows that the largest difference is for married females. While the projections suggest that 32.7 percent of married female beneficiaries will work (or 67.3 percent will not work), in the current data only 21.2 percent work. This difference of almost 12 percentage points is, in part, due to an increase in the pre-retirement employment of married women. While pre-retirement employment is not explicitly taken into account in our model, the model does incorporate individuals' earnings. Average recent earnings (divided by national average earnings) for married females has a mean value of 0.20 in the current data and has a significantly higher mean of 0.51 in the MINT projection data set.

The findings also suggest that married male beneficiaries and unmarried beneficiaries are more likely to be employed over the next few decades, but their increase in employment is less than for married females. The projections suggest that 43.7 percent of married male beneficiaries have non-zero earnings, while calculations based on the current data show that 35.1 percent have non-zero earnings, an increase of 8.6 percentage points. For unmarried persons, the increase is 8.2 percentage points.

Table 6-6 also compares the current and projected percentage of 62 year old beneficiaries in earnings groups 1 through 3, by marital status and gender. Columns 3 through 8 of the table show that the projected results place a higher fraction of beneficiaries into each of the three positive earnings groups (earnings group 1-3), as compared to the current estimates. Differences between the current and projected values range from 0.6 percentage points to 6.9 percentage points.

Tables 6-7 through 6-10 examine beneficiaries' work behavior by cohort. Beneficiaries born between 1931 and 1960 are placed into one of six cohort groups, where the cohort groups are in five-year increments. Looking down the six cohort groups in Table 6-7 reveals a decline, from the oldest to the youngest cohort, in the number of 62 year old beneficiaries who do *not* work. While 67.9 percent of beneficiaries in the 1931-35 cohort do not work, only 58.4 percent

Table 6-6
Percentage of 62 Year Old Beneficiaries in Each Earnings Group[a]
A Comparison of Current and Projected Values[b]

Marital Status/ Gender	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Current	Projected	Current	Projected	Current	Projected	Current	Projected
Total	70.4%	60.7%	20.3%	24.7%	6.2%	8.9%	3.2%	5.7%
Unmarried People	65.3	57.1	20.6	27.5	8.2	9.6	5.2	5.8
Married Males	64.9	56.3	25.3	27.1	7.0	10.2	2.8	6.4
Married Females	78.8	67.3	15.9	20.5	3.4	7.2	1.9	5.1

Table 6-7
Projected Percentage of
62 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort

Cohort	Earnings Group 0	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	60.7%	24.7%	8.9%	5.7%
1931-35	67.9	20.6	7.1	4.4
1936-40	62.7	23.3	8.4	5.6
1941-45	61.9	24.6	8.1	5.4
1946-50	59.6	25.7	8.7	5.9
1951-55	58.1	25.9	9.8	6.2
1956-60	58.4	25.6	9.9	6.1

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. Current, Urban Institute tabulations from the 1990-92 SIPP.

Table 6-8
Projected Percentage of 62 Year Old
Beneficiaries in Each Earnings Group[a,b]
By Cohort and Gender

Cohort	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Male	Female	Male	Female	Male	Female	Male	Female
Total	56.1%	63.9%	27.4%	22.8%	10.0%	8.1%	6.5%	5.2%
1931-35	63.3	70.8	21.9	19.8	8.8	6.1	6.1	3.3
1936-40	57.7	66.0	25.4	21.9	9.6	7.6	7.2	4.5
1941-45	57.5	64.9	27.3	22.8	9.4	7.2	5.7	5.2
1946-50	54.6	63.2	29.0	23.5	9.6	8.1	6.8	5.3
1951-55	52.9	61.6	29.5	23.5	10.9	9.1	6.7	5.9
1956-60	54.8	61.0	27.9	24.0	10.8	9.3	6.5	5.8

Table 6-9
Projected Percentage of 62 Year Old Beneficiaries Who Do and Do Not Work[b] By Cohort and Gender/Marital Status

	Not Working				Working			
Cohort	Unmarried Males	Married Males	Unmarried Females	Married Females	Unmarried Males	Married Males	Unmarried Females	Married Females
Total	55.2%	56.3%	57.8%	67.3%	44.8%	43.7%	42.2%	32.8%
1931-35	65.2	63.0	61.8	74.8	34.8	37.0	38.3	25.2
1936-40	57.7	57.8	58.7	70.1	42.3	42.3	41.3	29.9
1941-45	56.0	58.0	59.4	67.8	44.0	42.0	40.6	32.2
1946-50	54.0	54.7	59.4	65.2	46.0	45.3	40.6	34.8
1951-55	51.1	53.5	55.4	65.1	48.9	46.5	44.6	34.9
1956-60	55.8	54.5	55.7	64.2	44.2	45.5	44.3	35.8

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.

Table 6-10
Partial Retirement Earnings of 62 Year Old Beneficiaries in Each Earnings Group A Comparison of Current and Projected Values[a]

Marital Status/	Earnings Group 1		Earnings Group 2		Earnings Group 3	
Gender	Current	Projected	Current	Projected	Current	Projected
Total	0.107	0.108	0.314	0.314	0.516	0.520
Unmarried People	0.112	0.108	0.319	0.314	0.477	0.510
Married Males	0.111	0.107	0.309	0.313	0.548	0.538
Married Females	0.098	0.110	0.311	0.315	0.559	0.509

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. Current, Urban Institute tabulations from the 1990-92 SIPP.

of beneficiaries in the 1956-60 cohort do not work.[33] The fraction of beneficiaries not working falls for each successive cohort (moving from the oldest to youngest cohort), except for the youngest cohort, where the fraction not working increases very slightly. This slight increase in the fraction of persons with no earnings in the youngest cohort is consistent with the observed decline in projected earnings for this cohort. The mean of recent earnings (relative to the average wage) for 62 year old beneficiaries falls from 0.77 for the 1951-55 cohort to 0.72 for the 1956-60 cohort.

The fraction of beneficiaries in the other three earnings groups does not increase consistently across the six cohorts, but the fraction of beneficiaries in each group does follow an upward trend across the six cohorts.

Examining the distribution of beneficiaries across the four earnings groups by cohort and gender reveals that females are more likely than males to not work (see Table 6-8). This differential exists for all six cohort groups. It is smaller, however, for the youngest cohort (1956-60) than for the oldest cohort (1931-35).

Table 6-9 further breaks down beneficiaries by gender and marital status, enabling us to examine by cohort the work behavior of unmarried males, married males, unmarried females, and married females. For simplicity, earnings groups 1 through 3 are combined and we look only at the fraction of beneficiaries who *do* and *do not* work.

The largest difference across cohorts occurs between the 1931-35 and 1936-40 cohorts for unmarried males. While 65.2 percent of unmarried male beneficiaries in the 1931-35 cohort do not work, only 57.7 percent of unmarried males in the 1936-40 cohort do not work. This large decline is consistent with the decline in unmarried male beneficiaries' family pension benefits from the first to the second cohort. While the average family pension benefit (measured relative to national average earnings) is 0.31 for the 1931-35 cohort of unmarried male beneficiaries, it is only 0.17 for the 1936-40 cohort of unmarried male beneficiaries, a difference of 0.14. The difference in family pension benefits between the first and second cohort is most pronounced for the group of unmarried male beneficiaries, and ranges between 0.03 and 0.08 for the other three groups of 62 year old beneficiaries.

Separating beneficiaries by gender and marital status produces a trend across cohort groups that is less smooth as compared to the scenario when all 62 year old beneficiaries are grouped together (see Table 6-7). The trend for married females follows most closely that of all beneficiaries. The fraction of married females who are not working declines across all six cohorts. Among the other three demographic groups, the fraction not working is also lower for the 1956-60 cohort as compared to the 1931-35 cohort, but there is not a smooth trend across cohorts.

Projected Partial Retirement Earnings

After individuals are placed into one of the four earnings groups, those in groups 1 through 3 are assigned a level of earnings, which is measured relative to national average earnings. Projected partial retirement earnings are similar to the partial retirement earnings of current beneficiaries, as shown in Table 6-10. The similarities occur within each of the three earnings groups as well as across the three demographic groups. The mean of partial retirement earnings (divided by national average earnings) from the projection is 0.108 for beneficiaries in earnings group 1, 0.314 for beneficiaries in earnings group 2, and 0.520 for beneficiaries in earnings group 3.

The final table for 62 year old beneficiaries examines beneficiaries' projected earnings by cohort. The first column of Table 6-11 presents average partial retirement earnings for *all* 62 year old beneficiaries, including those beneficiaries with no earnings. Average partial retirement earnings among all beneficiaries is high for the younger cohorts than the older cohorts. This is consistent with the projections presented in Table 6-7 that shows a higher fraction of beneficiaries in the younger cohort have nonzero earnings as compared to beneficiaries in the older cohorts. Projected earnings for beneficiaries in earnings groups 1 through 3 are similar across the six cohort groups, although less so for the third earnings group.

Table 6-11
Projected Partial Retirement Earnings of 62 Year Old Beneficiaries in Each Earnings Group[a,b] By Cohort

Cohort	Total	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	0.084	0.106	0.314	0.505
1931-35	.067	.106	.314	.502
1936-40	.076	.106	.313	.488
1941-45	.086	.107	.315	.526
1946-50	.086	.105	.315	.486
1951-55	.094	.104	.314	.505
1956-60	.085	.109	.313	.516

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (April 1999) from the MINT projection file. Current, Urban Institute tabulations (January 1999) from the 1990-92 SIPP.

3. Projections for 67 Year Old Beneficiaries

Projected Earnings Group

As with 62 year old beneficiaries, the projections for older beneficiaries suggest that a higher fraction of beneficiaries will be employed over the next few decades, as compared to current estimates.[34] The difference between the current rate of employment and the projected rate of employment, however, is smaller for older beneficiaries. There is a 2.6 percentage point difference for older beneficiaries, as compared to a 9.7 percentage point difference for younger beneficiaries. Calculations from the current data show that 79.2 percent of older beneficiaries are not employed, whereas projections based on the MINT file suggest that 76.6 percent of beneficiaries will not be employed (see Table 6-12).

Table 6-12
Percentage of 67 Year Old Beneficiaries in Each Earnings Group[a]
A Comparison of Current and Projected Values

	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
Marital Status/ Gender	Current	Projected	Current	Projected	Current	Projected	Current	Projected
Total	79.2%	76.6%	15.5%	16.2%	2.7%	3.3%	2.7%	3.9%
Unmarried People	78.1	74.9	15.5	16.0	3.0	3.9	3.5	5.3
Married Males	72.0	74.3	21.1	19.5	3.5	3.4	3.5	2.9
Married Females	87.1	80.9	9.9	12.8	1.6	2.6	1.3	3.6

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.

b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. Current, Urban Institute tabulations from the 1990-92 SIPP.

Again, as with younger beneficiaries, a comparison of these percentages by marital status and gender shows that the largest difference is for married females. The projections suggest that the percentage of employed married female beneficiaries will on average be 6.2 percentage points higher over the next few decades than currently--19.1 percent in the projections sample compared with 12.9 percent in the baseline. This higher participation is due, in part, to the projected increase in the pre-retirement earnings of married women.

The findings also suggest that unmarried beneficiaries will be more likely to work over the next few decades. The projections suggest that 25.1 percent of unmarried beneficiaries will work (or that 74.9 percent will not work), while calculations based on the current data show that 21.9 percent are employed. This represents a difference of 3.2 percentage points. Projections for married male beneficiaries, however, show the opposite effect. Married male beneficiaries are projected to have slightly lower employment rates over the next few decades. This can be seen by

the increase in the probability of being in earnings group 0. While 72.0 percent of married male beneficiaries in the current data were in earnings groups 0, the projections suggest that 74.3 percent of married male beneficiaries will be in earnings groups 0. This represents an increase of 2.3 percentage points.

A comparison of the current and projected data for the percentage of 67 year old beneficiaries in earnings groups 1 through 3 is also presented in Table 6-12. For both unmarried persons and married females, the projections show a higher proportion of beneficiaries in earnings groups 1 through 3. For married male beneficiaries, on the other hand, the projections show a *lower* proportion of beneficiaries in earnings groups 1 through 3, as compared to the current data.

Table 6-13 examines the work behavior of 67 year old beneficiaries by cohort. Looking down the six cohort groups reveals a slight decline in the projected fraction of 67 year old beneficiaries not working. While 78.4 percent of beneficiaries in the 1931-35 cohort do not work, 75.7 percent of beneficiaries in the 1956-60 cohort do not work. The magnitude of the decline in the fraction of 67 year old beneficiaries not working is significantly smaller than the decline found for 62 year old beneficiaries (2.7 percentage points vs. 9.5 percentage points).

Table 6-13
Projected Percentage
of 67 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort

Cohort	Earnings Group 0	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	75.9%	16.9%	3.3%	3.9%
1931-35	78.3	15.1	3.3	3.4
1936-40	77.1	16.2	3.1	3.5
1941-45	76.1	17.0	3.3	3.6
1946-50	75.2	17.5	3.3	3.9
1951-55	74.8	17.0	4.0	4.2
1956-60	75.5	17.5	2.8	4.2

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (April 1999) from the MINT projection file.

Examining beneficiaries by gender shows that females are more likely to not work as compared to male (see Table 6-14). This differential exists across all six cohort groups, but the differential declines from 8.9 percentage points for the 1931-35 cohort to 2.7 percentage points for the 1956-60 cohort.

Table 6-15 further separates beneficiaries by gender and marital status: unmarried males, married males, unmarried females, and married females. While there is some variation across the cohorts, the differences across cohorts for 67 year old beneficiaries are somewhat smaller than the differences projected for 62 year old beneficiaries. For example, the difference between the oldest and youngest cohort in the fraction of married female beneficiaries not working is 5.2 percentage points for 67 year old beneficiaries, but was double this (10.6 percentage points) for 62 year old beneficiaries. This lower degree of variation for 67 year old beneficiaries is consistent with the lower degree of variation in recent earnings and family pension benefits for 67 year old beneficiaries, as compared to 62 year old beneficiaries.

Table 6-14
Projected Percentage of 67 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort and Gender

	Not Working				Working			
Cohort	Unmarried Males	Married Males	Unmarried Females	Married Females	Unmarried Males	Married Males	Unmarried Females	Married Females
Total	75.4%	74.3%	74.7%	80.9%	24.6%	25.8%	25.3%	19.1%
1931-35	74.9	72.9	78.7	84.7	25.1	27.1	21.3	15.3
1936-40	78.2	75.8	76.6	83.2	21.8	24.3	23.4	16.9
1941-45	77.0	74.6	73.7	81.4	23.0	25.4	26.3	18.6
1946-50	76.1	74.8	73.6	80.4	23.9	25.2	26.4	19.7
1951-55	75.1	73.0	74.4	79.2	24.9	27.0	25.6	20.9
1956-60	73.1	74.6	73.5	79.5	26.9	25.4	26.5	20.5

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.

Table 6-15
Projected Percentage of 67 Year Old Beneficiaries Who Do Not and Do Work [a] by Cohort and Gender/Marital Status

Cohort	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Male	Female	Male	Female	Male	Female	Male	Female
Total	74.5%	78.2%	18.6%	14.3%	3.4%	3.2%	3.5%	4.2%
1931-35	73.2	82.1	18.7	12.1	3.8	2.4	4.3	3.4
1936-40	76.2	80.2	17.4	13.2	3.0	2.9	3.5	3.7
1941-45	75.1	78.2	18.1	14.3	3.5	3.1	3.3	4.4
1946-50	75.1	77.5	18.2	14.7	3.0	3.2	3.7	4.7
1951-55	73.5	77.1	19.5	15.2	3.3	3.6	3.7	4.2
1956-60	74.2	76.9	19.0	15.1	3.8	3.6	3.0	4.5

Projected Partial Retirement Earnings

Once individuals are placed into one of the four earnings groups, individuals are assigned a level of earnings.[35] This procedure is more involved for older beneficiaries, as compared to the younger beneficiaries. This difference is due to the scheduled ad hoc increases, between 1995 and 2002, in the Social Security exempt amount for older beneficiaries. These ad hoc adjustments were enacted into law in March 1996, and substantially increased the exempt amount for older beneficiaries. In the absence of these ad hoc increases, the Social Security exempt amount for 67 year old beneficiaries would be roughly $14,500 in the year 2002, while it is scheduled to be $30,000 in the year 2002.[36]

Table 6-16 presents projected (average) partial retirement earnings for 67 year olds under two scenarios: (1) the projection *does not* take account of the scheduled increase in the exempt amount and (2) the projection *does* take account of the scheduled increase in the exempt amount. Models estimated with the 1984 SIPP suggest that a $1 increase in the exempt amount will increase earnings by (1) $0.25 for beneficiaries with earnings well below the exempt amount (group 1), (2) $0.94 for beneficiaries with earnings near or at the exempt amount (group 2), and (3) $1.00 for beneficiaries with earnings over the exempt amount (group 3).[37]

When the scheduled increases in the exempt amount are *not* taken into account, projected partial retirement earnings are similar to the partial retirement earnings of current beneficiaries. The similarities occur within each of the three earnings groups as well as across the three demographic groups. This can be seen by comparing columns one and two, columns four and five, and columns seven and eight. The mean of partial retirement earnings from the projection

Table 6-16
Average Partial Retirement Earnings of 67 Year Old Beneficiaries by Earnings Group[a]
A Comparison of Current and Projected Values[b]

	Earning Group 1			Earning Groups 2			Earning Group 3		
		Projection Includes Scheduled Increase in Exempt Amount			Projection Includes Scheduled Increase in Exempt Amount			Projection Includes Scheduled Increase in Exempt Amount	
Marital Status/ Gender	Current	No	Yes	Current	No	Yes	Current	No	Yes
Total	0.156	0.153	0.270	0.435	0.436	0.869	0.887	0.833	1.293
Unmarried People	0.158	0.159	0.276	0.433	0.433	0.871	0.798	0.806	1.271
Married Males	0.161	0.156	0.272	0.430	0.429	0.853	1.023	0.998	1.444
Married Females	0.140	0.142	0.259	0.447	0.449	0.889	0.733	0.739	1.202

that excludes the scheduled increase in the Social Security exempt amount is 0.153 for beneficiaries in earnings group 1, 0.436 for beneficiaries in earnings group 2, and 0.833 for beneficiaries in earnings group 3.

When the scheduled increases in the exempt amount are taken into account, projected partial retirement earnings are considerably higher. The mean of partial retirement earnings is 0.270 for beneficiaries in earnings group 1, 0.869 for beneficiaries in earnings group 2, and 1.293 for beneficiaries in earnings group 3. This increase occurs in all three demographic groups that are shown in Table 6-16 -- unmarried persons, married males, and married females.

The final table examines beneficiaries' projected earnings by cohort. Because scheduled increases in the Social Security exempt amount affect later cohorts more than earlier cohorts, primarily the 1931-35 cohort, this table presents projected earnings that both do and do not take account of scheduled increases in the exempt amount. The first column of Table 6-17 presents projections of average partial retirement earnings for all 67 year old beneficiaries, which do not take account of scheduled increases in the exempt amount, and includes those beneficiaries with zero earnings. Average partial retirement earnings do not differ substantially across the six cohorts, although earnings are projected to be higher for beneficiaries in the younger cohorts as compared to beneficiaries in the older cohorts. This is consistent with the finding that, in general, a larger fraction of beneficiaries in the younger cohorts will be working than beneficiaries in the older cohorts. Within earnings groups 1 through 3, projected earnings that exclude scheduled increases in the exempt amount are similar across cohorts. However, when the scheduled increase in the exempt amount is taken into account there is a large difference between the partial retirement earnings of beneficiaries in the first cohort as compared to later cohorts. This is because beneficiaries in the first cohort are least affected by this policy change.

Table 6-17
Projected Partial Retirement Earnings of 67 Year Old Beneficiaries in each Earning Group[a,b]
By Cohort

Cohort	Total		Earning Group 1		Earning Groups 2		Earning Group 3	
	Includes Exempt Amount Increase		Includes Exempt Amount Increase		Includes Exempt Amount Increase		Includes Exempt Amount Increase	
	No	Yes	No	Yes	No	Yes	No	Yes
Total	0.072	0.123	0.153	0.270	0.436	0.869	0.833	1.293
1931-35	0.067	0.090	0.151	0.207	0.436	0.641	0.842	1.075
1936-40	0.065	0.114	0.151	0.275	0.430	0.891	0.812	1.300
1941-45	0.071	0.125	0.151	0.275	0.436	0.896	0.824	1.312
1946-50	0.075	0.130	0.156	0.276	0.436	0.896	0.840	1.329
1951-55	0.074	0.131	0.153	0.276	0.436	0.896	0.835	1.323
1956-60	0.074	0.131	0.155	0.279	0.437	0.898	0.839	1.328

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.Current, Urban Institute tabulations from the 1990-92 SIPP.

APPENDIX A
ESTIMATING MODELS

The discussion in this appendix uses the model for 65-68 year olds as the base case, but references are made where the models for 65-68 year olds and 62-63 year olds differ.

Model 1: Probit and Earnings: The first equation in this two-equation model incorporates the decision to work or not work, and the second is the earnings equation for those individuals who work. The equation for the decision to work is defined below, where the first subscript refers to the model number (in this case model 1) and the second subscript refers to the equation number within the model:

$$W^* = \beta_{1,1}Z + \gamma_{1,1}R + \delta_{1,1}AvgEarn_{(35-59)} + \psi_{1,1}AvgEarn_{(60-64)} + \xi_{1,1}EX + \varepsilon_{1,1}$$

Z is a vector of demographic characteristics (including race/ethnicity, educational attainment, gender, marital status, and age), R includes measures of non-labor income available in retirement (401(k), IRA, and Keogh account balances, pension income, and wealth), $AvgEarn_{(35-59)}$ is individuals' average earnings from age 35 through age 59 (where earnings in each year are divided by national average earnings), $AvgEarn_{(60-64)}$ is individuals' average earnings from age 60 through age 64 (divided by national average earnings), and finally, EX is the Social Security exempt amount (which is also divided by national average earnings).[38]

The second equation in this two-step model is the reduced-form equation for level of earnings, and it is estimated only on the subset of persons who have nonzero earnings. Thus, earnings for this group of beneficiaries are greater than zero but less than the amount at which the Social Security benefit is reduced to zero.

$$E = b_{1,2}Age + \gamma_{1,2}R + \psi_{1,2}AvgEarn_{(60-64)} + \xi_{1,2}EX + \lambda + \varepsilon_{1,2}$$

The set of explanatory variables is similar to those in the first-stage probit equation, but average earnings from age 35 to age 59 and most of the demographic variables are omitted. This earnings variable is excluded from the model because it is unlikely that, for this group of Social Security beneficiaries, average earnings from age 35 to 59 adds additional information beyond earnings

from age 60 to 64.[39] Another difference is that this equation includes a sample selection term, λ. This term, referred to the literature as the "inverse mills ratio," takes account of the fact that working recipients are different from non-working recipients. In this model, the probit and earnings equation are estimated as a system so the standard errors are efficient.

Model 2: Ordered Probit and Earnings: This model examines factors that influence on which segment of the earnings distribution a beneficiary falls. In this specification of the model, beneficiary are in one of four earnings groups: (1) zero earnings, (2) earnings greater than 0 but less than 85 percent of the exempt amount, (3) earnings between 85 percent and 115 percent of the exempt amount, and (4) earnings greater than 115 percent of the exempt amount. The equation for model 2 is very similar to the probit equation estimated under Model 1, and can be written as:

$$S^{*} = \beta_{2,1}Z + \gamma_{2,1}R + \delta_{2,1}AvgEarn_{(35-59)} + \psi_{2,1}AvgEarn_{(60-64)} + \xi_{2,1}EX + \varepsilon_{2,1}$$

The dependent variable S* indicates in which segment of the earnings distribution an individual falls, and equals 0 if the individual has zero earnings, 1 if the individual has earnings greater than 0 but less than 85 percent of the exempt amount, etc. The independent variables are as described above under model 1.

APPENDIX B
PROBIT/EARNINGS MODELS

This appendix presents the results of preliminary probit/earnings models estimated with the 1990-92 SIPP data. The model results are presented first for 62-63 year old beneficiaries and then for 65-68 year old beneficiaries.

Table 6-B-1
Probit/Earnings Model
Social Security Beneficiaries Age 62 to 63, 1990-92 SIPP

Explanatory Variable	Probit (obs=1,560)		Earnings Ratio (obs=437)	
Non-Hispanic white	0.1297	(0.1053)		
Education less than 12th grade	** -0.4097	(0.1004)		
Education equal to 12th grade	-0.1355	(0.0887)		
Male	* 0.1830	(0.1010)		
Married in calender year	-0.1233	(0.0810)		
Age 63	-0.0722	(0.0718)	-0.0220	(0.0524)
Family pension	** -0.0284	(0.0049)	-0.0013	(0.0054)
Income from assets	-0.0071	(0.0048)	-0.0001	(0.0027)
Balance of 401K, IRA, Keogh	0.0001	(0.0019)	-0.0005	(0.0012)
Average past earnings (ages 35-55)	-0.1348	(0.1115)		
Average recent earnings (ages 56-61)	** 0.5486	(0.0905)	0.0660	(0.0903)
Constant	** 0.6862	(0.1367)	** -0.7244	(0.2253)
Inverse Mills Ratio[a]			-0.1329	(0.1847)
Pseudo R-squared/R-squared[b]	0.066		0.0151	
Chi-squared / F-statistic[c]	122.07 (df=11)		1.03 (df= 6, 430)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

Table 6-B-2
Probit/Earnings Model
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Probit (obs=3,574)		Earnings (obs=822)	
Non-Hispanic white	-0.0613	(0.0711)		
Education less than 12th grade	** -0.3032	(0.0663)		
Education equal to 12th grade	-0.0610	(0.0609)		
Male	** 0.3330	(0.0655)		
Married in calender year	* -0.1083	(0.0555)		
Age 66	-0.0690	(0.0658)	0.0175	(0.0249)
Age 67	** -0.2633	(0.0686)	0.0229	(0.0275)
Age 68	** -0.3120	(0.0698)	-0.0333	(0.0277)
Family pension	** -0.0276	(0.0036)	** -0.00306	(0.0015)
Income from assets	** -0.0083	(0.0031)	0.0007	(0.0012)
Balance of 401K, IRA, Keogh	** 0.0020	(0.0010)	* -0.0006	(0.0003)
Average past earnings (ages 35-59)	** -0.3122	(0.0709)		
Average recent earnings (ages 60-64)	** 0.8761	(0.0613)	** 0.1307	(0.0240)
Constant	** 0.50913	(0.0938)	** -0.3496	(0.4839)
Inverse Mills Ratio[a]			-0.0641	(0.0618)
Pseudo R-squared/R-squared[b]	0.1051		0.1457	
Chi-squared / F-statistic[c]	405.14 (df=13)		7.40 (df= 8, 813)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

APPENDIX C
VARIABLES

This appendix presents a brief explanation of the variables included in the models.

Dependent Variables:

Earnings Group: In the ordered probit model, this variable equals 0 if the individual has no earnings, equals 1 if earnings are greater than 0 but less than 85 percent of the exempt amount, equals 2 if earnings are between 85 percent and 115 percent of the exempt amount , and equals 3 in earnings are greater than 115 percent of the exempt amount.

Earnings: Ratio of individual earnings to national average earnings.

Explanatory Variables:

Exempt Amount: Ratio of the Social Security exempt amount to national average earnings.

Average Earnings: Earnings, as described above, averaged over the appropriate years.

Family Pension Income: Family (individual and spouse) pension income divided by national average earnings.

Family Wealth: Family wealth divided by national average earnings.

Family Retirement Account Balances (IRA, 401k, and Keogh): Family account balances divided by national average earnings.

Age: Dummy variables for age. In the model for 65-68 year olds, the excluded age is 65. In the model for 62-63 year olds, the excluded age is 62.

Non-Hispanic White: Variable equals 1 if the individual is non-Hispanic white, and equals zero otherwise. Other race/ethnicity categories were considered, but the groups are small -- 86 percent of the sample is non-Hispanic white.

Education: Two education variables are included in the models -- education less than high school and education equals to high school (the excluded category is education greater than high school). Seventy-three percent of the sample members have a high school degree or less.

Male: This variable equals 1 if the individual is male, and equals 0 if the individual is female.

Married: This variables equals 1 if the individual was married during the particular calendar year, and equals zero otherwise.

APPENDIX D
ESTIMATION AND PROJECTION RESULTS THAT INCLUDE RETIREMENT ACCOUNT BALANCES

This appendix presents results of the estimation and projection of partial retirement earnings for beneficiaries when family retirement account balances are taken into account in the analysis.

Table 6-D-1
Ordered Probit Model by Marital Status and Gender[a]
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Unmarried People (n=1,831)		Married Males (n=2,121)		Married Females (n=2,170)	
Education Less than 12th Grade	-0.3636 **	(0.0887)	-0.2947 **	(0.0661)		
Education Equal to 12th Grade	-0.1082	(0.0843)				
Spouse's Age			-0.0171 **	(0.0052)	-0.0127	(0.0082)
Age 66	-0.1799 *	(0.0956)				
Age 67	-0.2590 **	(0.0941)	-0.1800 **	(0.0717)	-0.1525 *	(0.0882)
Age 68	-0.3134 **	(0.0943)	-0.3171 **	(0.0729)	-0.2771 **	(0.0963)
Family Wealth [b]	-0.0071	(0.0098)	-0.0007	(0.0046)		
Family Pension Benefits	-1.2981 **	(0.1838)	-0.6591 **	(0.0807)	-0.3993 **	(0.0964)
Family Retirement Account Balances	0.1461 **	(0.0486)			0.0346	(0.0256)
Average Past Earnings (ages 35-59)	-0.1254	(0.0957)	-0.5460 **	(0.0769)		
Average Recent Earnings (ages 60-64)	1.0067 **	(0.0891)	0.7097 **	(0.0531)	1.4283 **	(0.0928)
Pseudo R-squared	0.0949		0.0845		0.1292	
Chi-squared	238.94 (df=10)		278.02 (df=8)		259.03 (df=6)	
Cutoff value 1	0.5887	(0.1044)	-1.0196	(0.3316)	0.3906	(0.5619)
Cutoff value 2	1.4245	(0.1108)	-0.0222	(0.3315)	1.3291	(0.5641)
Cutoff value 3	1.7888	(0.1183)	0.3688	(0.3326)	1.7201	(0.5670)

a These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b Family wealth, family pension benefits, average past earnings, and average recent earnings are divided by national average earnings.
c Standard errors in parenthesis.
d Significance at 5 percent is represented by "**".
e Significance at 10 percent is represented by "*".

Table 6-D-2[a]
Percentage of 67 Year Old Beneficiaries in Each Earnings Group[b]
A Comparison of Current and Projected Values[c]

Marital Status/ Gender	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Current	Projected	Current	Projected	Current	Projected	Current	Projected
Total	79.1%	75.1%	15.5%	16.3%	2.7%	3.3%	2.7%	5.3%
Unmarried People	78.1	71.5	15.5	16.0	3.0	3.8	3.5	8.8
Married Males	72.0	74.3	21.1	19.5	3.5	3.4	3.5	2.9
Married Females	87.1	79.9	10.0	13.2	1.6	2.8	1.3	4.1

Table 6-D-3[a]
Average Partial Retirement Earnings
of 67 Year Old Beneficiaries by Earnings Group[a]
A Comparison of Current and Projected Values[b]

Marital Status/ Gender	Earning Group 1			Earning Groups 2			Earning Group 3		
	Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount	
		No	Yes		No	Yes		No	Yes
Total	0.156	0.151	0.268	0.435	0.436	0.871	0.887	0.823	1.288
Unmarried People	0.158	0.156	0.273	0.433	0.432	0.871	0.798	0.805	1.275
Married Males	0.161	0.156	0.272	0.430	0.429	0.853	1.023	0.998	1.444
Married Females	0.140	0.138	0.255	0.447	0.450	0.893	0.733	0.738	1.203

a) This table is based on the ordered probit model presented in Table 6-D-1, which includes family retirement balances.
b) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent amount; and Group 3, earnings greater than 115 percent of the exempt of the exempt amount.
c) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.
Current, Urban Institute tabulations from the 1990-92 SIPP.

APPENDIX E
SIMULATING WORK BEHAVIOR FROM AGES 63 TO 66 AND AFTER 67

I. OVERVIEW

This appendix describes the method that the MINT model employs for filling in individual earnings between ages 62 and 67 and after age 67. This part of the model combines information from Chapters 2 and 6 with a simple model of the likelihood of remaining in partial retirement. It creates a full stream of earnings from age 62 until death for each person who survives to age 62.

When each person in the MINT sample attains age 62, we determine whether he or she has begun to collect Social Security benefits. If he or she has, then we set his/her earnings level in that year using the projections from the current chapter. If the person has not yet begun receiving Social Security, we continue to use the Chapter 2 projection estimates for his/her earnings level until the time of Social Security benefit take-up. When a person starts Social Security benefit receipt after age 62, he/she receives a starting value for partial retirement earnings at the point of take-up (if retiring at age 67, this is the exact value for earnings at 67 from earlier in this chapter). Any person who begins receiving her/his benefits before age 67 is then subjected to a probability of remaining in the labor force for each age between the age of first receipt and age 66. If the person's probability of remaining at work in a given year is higher than a random draw, then he or she continues to work and receives the same wages as he/she received in the prior year. At age 67, nearly all members of the population receive their Chapter 6 earnings projection. After age 67, those who are still working are similarly subjected to a probability of remaining at work in each subsequent year, and they continue to work at their age 67 wage level until they either die or one of their random draws is higher than their stay-at-work probability for that year. Individuals' probabilities of continuing to work are generated by a relatively simple logistic regression equation which we describe below.

Four separate groups thus receive differential treatment in the process of updating earnings after age 62. These include: those who begin Social Security receipt at age 62, those who begin Social Security receipt between ages 63 and 66, inclusive, those who begin Social Security receipt at age 67, and those who do not collect Social Security. To detail operation of the model more clearly, we illustrate the treatment of each of these four groups in turn.

1. Person Starts to Receive Social Security at or before age 62

If an individual begins receiving Social Security benefits at or before age 62, we overwrite the Chapter 2 prediction of earnings at age 62 with the partial retirement earnings prediction from Chapter 6. If predicted earnings are positive, we look forward to see if this person will, according to the Chapter 6 estimate, still be working at age 67. If so, we then use the person's predicted probability of working at age 62 to adjust each of the person's random draws from age 63 to age 66 downward so that each draw will be lower than the probability of staying in partial retirement. We do this in order to promote consistency in work trajectories, so that people will not be jumping into and out of partial retirement each year. If the person is not selected to work at age 67, then he/she is exposed to random draws that are adjusted upward. (These two adjustments are made in such a way as to preserve the initial uniform distribution from which draws are made). When workers choose, through the random process, to continue to work, their earnings levels are kept constant from the prior year. After age 67, if the person is working at t-1 then he/she is again exposed annually to a probability of remaining in partial retirement and an independent random draw from a uniform distribution determines whether he/she continues working. If he or she continues to work, he or she does so at the age 67 wage level.

2. Person Starts to Receive Social Security between ages 63 and 66

A person who does not retire until after age 62 retains earnings values from Chapter 2 until the year of Social Security retirement. Since people who do not receive Social Security until after age 62 are not subjected to the Chapter 6 projections at age 62, we need some kind of starting value for their earnings in partial retirement. We use a separate prediction, produced by applying the algorithm for 62 year-olds from earlier in this chapter to the general population rather than just the age 62 retiree population, to generate a starting value for these people. We then update this projection, using the logistic equations and random draws as above, through age 66. If applicable, this process continues at ages 68 and beyond, using the age 67 earnings level prediction.

3. Start to Receive Social Security at age 67

The starting value for earnings of individuals in this group is simply the Chapter 6 prediction at age 67. For each successive year at risk (i.e., each year with nonzero earnings at t-1), a new probability of remaining in partial retirement is calculated and an independent random draw is taken. If, on the basis of the random draw, a person chooses to continue to work, then her/his earnings level at age 67 is maintained.

4. Never Receive Social Security

For the small fraction of the population that never receives Social Security, earnings from Chapter 2 are maintained from age 62 through age 67 and earnings are set to zero thereafter.

II. EQUATIONS FOR GENERATING PROBABILITY OF REMAINING IN PARTIAL RETIREMENT

The MINT model of likelihood of remaining in partial retirement is structurally quite similar to the Social Security benefit receipt model. It is also a discrete-time, conditional transition probability model, and it was estimated from the same data sources. As the preceding discussion suggests, in this case the probability we are modeling is the probability that one remains in partial retirement given that one was engaged in partial retirement (that is, work concurrent to Social Security benefit receipt) at time t-1. For estimation of this model, person-year observations start at age 63 rather than age 62 (since most people cannot be partially retired at age 61) and continue much further than in the benefit take-up model, up to age 80.

As in the Social Security benefit take-up model, we use a person-birth year rather than a person-calendar year as the unit of analysis for estimating model parameters. This implies that while we use MBR data to confirm a person's Social Security receipt, we use SIPP monthly self-report data on earnings rather than annual (i.e., calendar-year) data from Summary Earnings Records. Determining whether an individual is a worker or a non-worker in a given birth year of partial retirement poses numerous measurement challenges. In a series of alternative tabulations, we found that our estimates are extremely sensitive to whether we use just the birth month or the birth month and the prior month, or some other combination of lags, in assessing work behavior.

The SIPP estimates suggest that these partial retirees are a special, select group. We did not identify any significant differences in likelihood of staying in partial retirement across gender, racial, or marital status lines, and thus chose to estimate a single equation rather than separate equations by sex or marital status group for this portion of MINT. The explanatory variables in the model of partial retirement focus on two major characteristics: one's *taste for work* and the *return that one gets from working*. Taste for work is reflected first by the duration of the current work spell, that is, the time that has elapsed since one has had a year of zero earnings. A term interacting age with a dummy variable indicating whether one has less than a high school education reflects the hypthesized increasing lack of desirability of work for the less educated as one ages. Persons with less than a high school education are far more likely to be in positions that are unrewarding and/or physically demanding, and strains of such jobs are likely to increase with age. A person's lagged earnings reflects both his or her revealed preference for work and her/his potential returns from working. An age 65 dummy variable captures a person's eligibility for Medicare at this age, a factor which greatly diminishes one significant incentive to continued

work, the availability of employer-provided health insurance benefits. A person's wealth profile is reflected in the model through both a home ownership dummy variable and an age-home ownership interaction term.

III. COEFFICIENT ESTIMATES

Table 6-E-1 presents the logistic coefficients from the model estimation phase. We see that the likelihood of remaining in partial retirement increases with our indicators of attachment to the labor force and returns to working, as evidenced by the positive signs on coefficients for duration of work spell and level of lagged earnings, and decreases when work incentives decline, as evidenced by the negative sign on the coefficient for the age 65 dummy variable. Past earnings tend to depress the likelihood of continuing to work, with higher earnings from both ages 35 to 55 and ages 56 to 61 suggesting a lesser likelihood of additional work, though these relationships are not statistically significant. While wealth, as evidenced here through homeownership, actually increases the likelihood of staying at work, this effect declines with age. For those with very little education (less than a high school degree), the likelihood of working declines with age.

Table 6-E-1
Logistic regression coefficients: Remain in Partial Retirement

Variable	Parameter Estimate (Standard Error) N=3317 person years
Intercept	0.4324** (0.1019)
Age 65	-0.2457** (0.1299)
Duration of current work spell	0.0205** (0.00275)
Age*Education < 12	-0.00341** (0.00127)
Age*Homeowner	-0.0255* (0.0124)
Homeowner?	2.0373* (0.8559)
Earnings ages 35-55	-0.1531 (0.1169)
Earnings ages 56-61	-0.1519 (0.0950)
Earnings at t-1	0.1930* (0.0836)

* indicates p<.05; ** indicates p<.01

Source: Urban Institute estimates, September, 1999

IV. RESULTS FROM SIMULATION ANALYSES

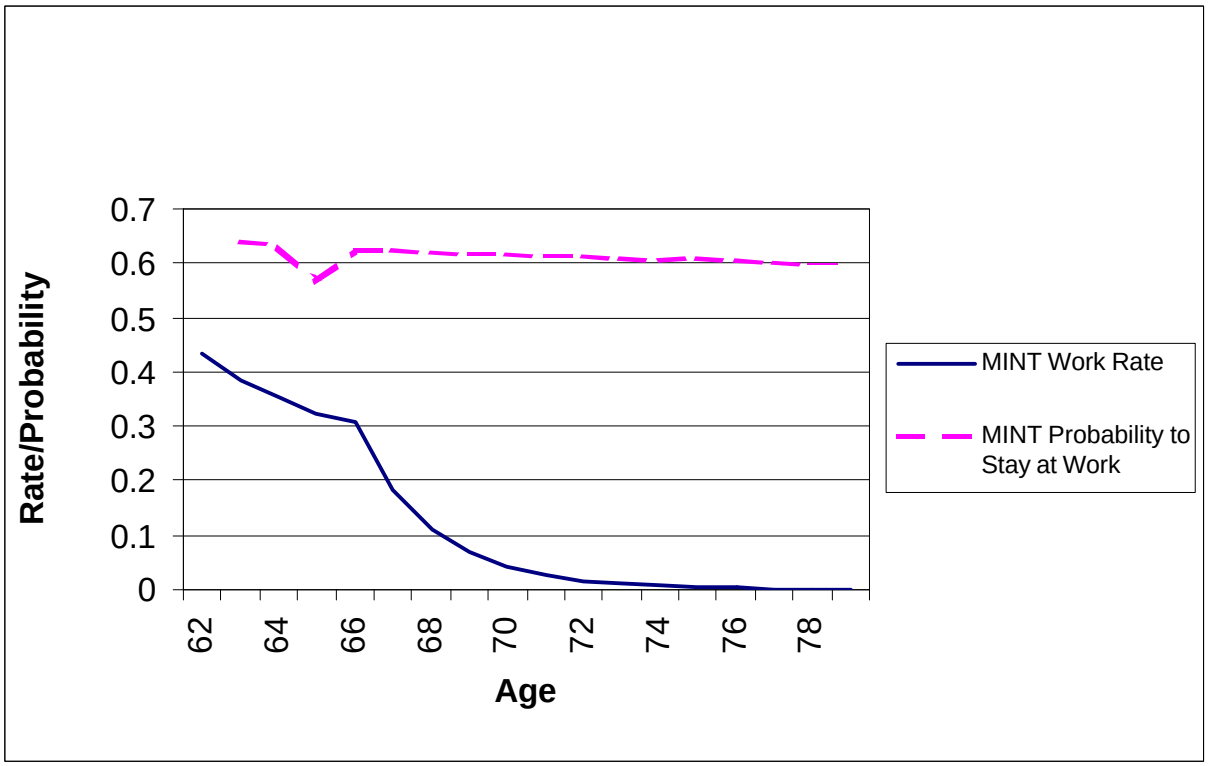
When we apply these coefficients annually to the members of the MINT sample who are partially retired, we find that average probabilities of remaining in partial retirement are around 0.63 in the first years of retirement, between ages 62 and 64, decline to 0.57 at age 65, but then level off to a rate of around 0.60 at later ages. Figure 6-E-1 contrasts MINT generated probabilities to remain in work after age 62 and the work rates that these probabilities imply. While the average probabilities that MINT generates are roughly consistent with estimates from other sources, the work rates are systematically lower in MINT, even for workers in older cohorts, than are found in data sets like SIPP and CPS. While fractions of U.S. residents in the labor force after age 75 are indeed small, less than one in twenty according to recent (1996) U.S. Census Bureau estimates, they are nontrivial, and MINT clearly understates them.

There are several reasons for the discrepancy between MINT and other sources. First, because the MINT model assumes full retirement (for Social Security purposes) at age 67, and thus earnings levels within a fairly constrained range for older workers, this portion of the model generates an unrealistically low proportion of the population in the labor force at ages greater than 67. Recall from Table 6-E-1 that lagged earnings are a major predictor of subsequent work. If lagged earnings cannot go above 1.5 times the Social Security exempt amount, then probabilities of staying at work will be too low at several critical points. The fact that the model does not currently allow re-entry into employment after age 67 further exacerbates this problem.

It is also important to note that beyond age 70 the earnings of Social Security recipients are no longer subject to the retirement test, so individuals no longer have an incentive to keep earnings at or below the exempt amount. MINT does not at this time take this policy into account. While few individuals are affected by this change, this shift could greatly impact the aggregate amount of earnings income generated in the model.

In general, then, additional development of this portion of the model could address these shortcomings, and help to calibrate its estimates more closely to external benchmarks. Greater calibration of this portion of MINT could make it a valuable tool for examining this small but interesting group of working Social Security recipients.

Figure 6-E-1
Age Patterns in Work at and after Age 62



Source: Urban Institute tabulation, September, 1999

CHAPTER 6: REFERENCES

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CHAPTER 6: ENDNOTES

1. The normal retirement age is currently 65 years old but is scheduled to increase to 67 by the year 2022.

2. Individuals from the 1990 SIPP panel were born between 1926 and 1928, individuals from the 1991 panel were born between 1927 and 1929, and individuals from the 1992 panel were born between 1928 and 1931.

3. For example, beneficiaries who were 62 years old in 1990 and 63 year olds in 1991 were included in the sample twice.

4. Allowing an individual to enter the sample more than once implicitly assumes that their behavior in one year is independent of their behavior in the next year. While independence across time may not hold, models estimated for older beneficiaries (age 65-68) suggest that including beneficiaries in the sample multiple times has little effect on the estimated coefficients (see below).

5. An individual is identified as working if they have covered earnings, as recorded on the SER data file.

6. The sample of older beneficiaries (65-68 year olds) is significantly larger than the sample for younger beneficiaries, so we estimated models on a sample of unique individuals as well as on a sample where individuals are included multiple times. The estimated coefficients from these two models were similar.

7. Individuals from the 1990 SIPP panel were born between 1921 and 1925, individuals from the 1991 panel were born between 1922 and 1926, and individuals from the 1992 panel were born between 1923 and 1928.

8. In the 20 years prior to 1995, the 1977-83 period is the only one in which there was an exogenous (or "ad hoc") increase in the exempt amount (relative to the average wage) for persons age 65 through 68. Also, during this time, there was no exogenous increase in the exempt amount (relative to the average wage) for persons age 62 through 64.

9. This is because the design requires us to use the 1984 SIPP to look "back" at individuals' behavior between 1977 through 1983.

10. Burtless and Moffitt (1984) p. 156.

11. The samples are: 65-68 year olds with the 1984 SIPP, 65-68 year olds with the 1990-92 SIPP, and 62-63 year olds with the 1990-92 SIPP.

12. See Appendix 6-A for details of the probit/earnings model.

13. These models were estimated with the 1990-92 SIPP and are presented in Appendix 6-B, Tables B-6-1 and B-6-2.

14. See Appendix 6-A for details of the ordered probit model.

15. The earnings are assigned in a way that allows us to incorporate the effect of the scheduled increases in the Social Security exempt amount on beneficiaries' earnings. This procedure is described in more detail in the next section.

16. This approach is valid because the Social Security exempt amount is orthogonal to the other explanatory variables in the model (i.e., the individuals' demographic and economic characteristics).

17. The first earnings equation includes all persons with earnings greater than 0 but less than 85 percent of the exempt amount, the second earnings equation includes persons with earnings between 85 percent and 115 percent of the exempt amount, and the third earnings equation includes persons with earnings greater than 115 percent of the exempt amount.

18. See Appendix 6-C for details about these explanatory variables.

19. Average earnings are calculated starting at age 45 in the sample from the 1984 SIPP because it is the first age at which earnings is available for the entire sample (since the earliest year of earnings is 1951).

20. Marital status is excluded from the analysis of the 1984 SIPP because this variable is missing for roughly 50 percent of sample. This large percentage of missing data is due to the fact that the marital history questions were asked at the end of the survey period. Note that the model results were altered only minimally when this variable was included.

21. Only the more recent measure of average earnings is included in the earnings equation because it is unlikely that, for this group of Social Security beneficiaries, average earnings from the more distant past adds additional information beyond recent earnings.

22. The pseudo-R-squared is defined as (1 - Lu/Lr), where (1) "Lu" is the log-likelihood value of the "unrestricted" model and (2) "Lr" is the log-likelihood value of the "restricted" model. The ratio of the unrestricted log-likelihood and restricted log-likelihood (Lu/Lr) is between zero and one, so the pseudo-R-squared also falls between zero and one.

23. Of the 6,138 beneficiaries, 4,912 are in earnings group 0, 912 in earnings group 1, 156 in earnings group 2, and 158 in earnings group 3.

24. While the final projections exclude the effects of family retirement account (401(k), IRA, and Keogh) balances, Table 6-D-2 in Appendix 6-D presents the projections based on the coefficients that include family account balances.

25. The P-value for the estimated coefficients are 0.44 to 0.91, respectively. Also note that family retirement account balances is excluded because the P-value is very high at 0.94.

26. The P-values range from 0.73 to 0.93.

27. An extension of this approach would be to estimate different effects by gender and marital status.

28. The model results with regard to the other variables in the model suggest that (1) non-Hispanic whites are less likely to work, (2) persons with less than a high school education are less likely to work, (3) males are more likely to work, (4) older persons are less likely to work, and (5) higher average earnings between the ages of 60 and 64 increases the probability of working, while higher average earnings between the ages of 45 and 59 decrease the probability of working.

29. Subsequent refinements of the model should, however, incorporate revised definitions of the earnings groups. Further tests of beneficiaries' responses to increases in the Social Security exempt amount suggest that our estimates may be biased upwards. Our additional work suggests that the regression coefficient is about 0.06 (rather than 0.25) for beneficiaries in group 1 and 0.80 (rather than 0.94) for beneficiaries in group 2. It is unlikely, however, that this will have the significant effect on the overall MINT results.

30. Earnings are measured as the ratio of nominal earnings to national average earnings.

31. The weights available in 1990-92 SIPP panels are taken into account with this procedure.

32. These percentages and all other percentages presented below are based on weighted data.

33. Individuals in 1931-35 cohort are age 62 between 1993 and 1997, while individuals in the 1956-60 cohort are age 62 between 2018 and 2022.

34. As is the case for younger beneficiaries, the current rates of employment are based on calculations from the 1990-92 SIPP.

35. As with younger beneficiaries, earnings are measured relative to national average earning.

36. This estimate of $14,500 is based on the expected increase in the exempt amount for younger beneficiaries (i.e., persons under the normal retirement age) to the year 2002.

37. The estimated coefficient on the exempt amount for earnings group 3 is 1.44, but we use 1.00 in the projection because (1) we cannot reject the null hypothesis that this coefficient is equal to 1.0 and (2) we do not expect this coefficient to be higher than 1.0.

38. The model for 62-63 year olds is similar except that (1) earnings are average from age 35 to age 55 for the first earnings measure and from age 56 to age 61 for the second earnings measure and (2) the exempt amount is excluded from the model (since there is no variation in the exempt amount for this group).

39. For 62-63 year old beneficiaries, average earnings from age 35 to age 55 is excluded from the earnings equation.